



**CALIFORNIA  
ENERGY COMMISSION**



California Energy Commission

## **California Schools Healthy Air, Plumbing, and Efficiency Online System**

# **HVAC Assessment Report Companion Document**

September 2022



## **CalSHAPE HVAC Assessment Report Companion Document**

The California Energy Commission administers the California Schools Healthy Air, Plumbing, and Efficiency (CalSHAPE) Program. The CalSHAPE Ventilation Program requires qualified testing personnel or qualified adjusting personnel to prepare an assessment report for review by a licensed professional. The licensed professional shall review the assessment report and determine what, if any, additional adjustments, or repairs would be necessary to meet the minimum ventilation and filtration requirements and determine whether any cost-effective energy efficiency upgrades or replacements are warranted or recommended (CalSHAPE Ventilation Program Guidelines, Chapter 2, Section F).

The CalSHAPE HVAC Assessment Report Companion Document provides step-by-step instructions on how to complete the HVAC Assessment Report. The instructions also include general information and tips on navigating the reporting tool.

The [CalSHAPE Online System](https://calshape.energy.ca.gov/) (system) can be accessed at <https://calshape.energy.ca.gov/>.

A user must have an account in the system to input information on the HVAC Assessment Report. Instructions to register for a user account in the system are provided in the [CalSHAPE Online Registration Instructions](https://www.energy.ca.gov/media/5800) found at <https://www.energy.ca.gov/media/5800>.

This companion document is provided for informational purposes only to assist users in the completion of the HVAC Assessment Report. It does not include CalSHAPE Ventilation Program information or requirements. CalSHAPE Ventilation Program information and requirements are provided in the CalSHAPE Ventilation Program Guidelines, found on the [CalSHAPE Program webpage](https://www.energy.ca.gov/publications/2022/california-schools-healthy-air-plumbing-and-efficiency-ventilation-program) at <https://www.energy.ca.gov/publications/2022/california-schools-healthy-air-plumbing-and-efficiency-ventilation-program>.

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## General Information and Navigation

### **Multiple Users:**

- Multiple users can be in one HVAC Assessment Report at the same time. A user can overwrite another user's information based on the most recent saved information in the system.

### **Assessment Navigation:**

- Navigation buttons are found throughout the HVAC Assessment Report pages:
  - Clicking the blue button at the top of the page will take you to the "HVAC Equipment Details for HVAC Unit" page.
  - Saving an HVAC Unit section will return users to the "HVAC Equipment Details for HVAC Unit" page.
  - Internet browser navigation buttons are also an option for use.
  - Please note, some internet browsers have the backspace button as a backward navigation option.

### **Required Fields:**

- All required fields are labeled in a red font. All required fields must be filled out to save the section.

### **Not Applicable:**

- For any items that are found to be not applicable/available, please enter a negative one (-1) value.

### **Upload Files Button:**

- Upload file button is used for any documents, pictures, or any required materials needed for the HVAC Assessment Report.
  - Refer to the File Matrix document for more information.

### **Notes:**

- Utilize "Notes" field for all additional information or explanation.

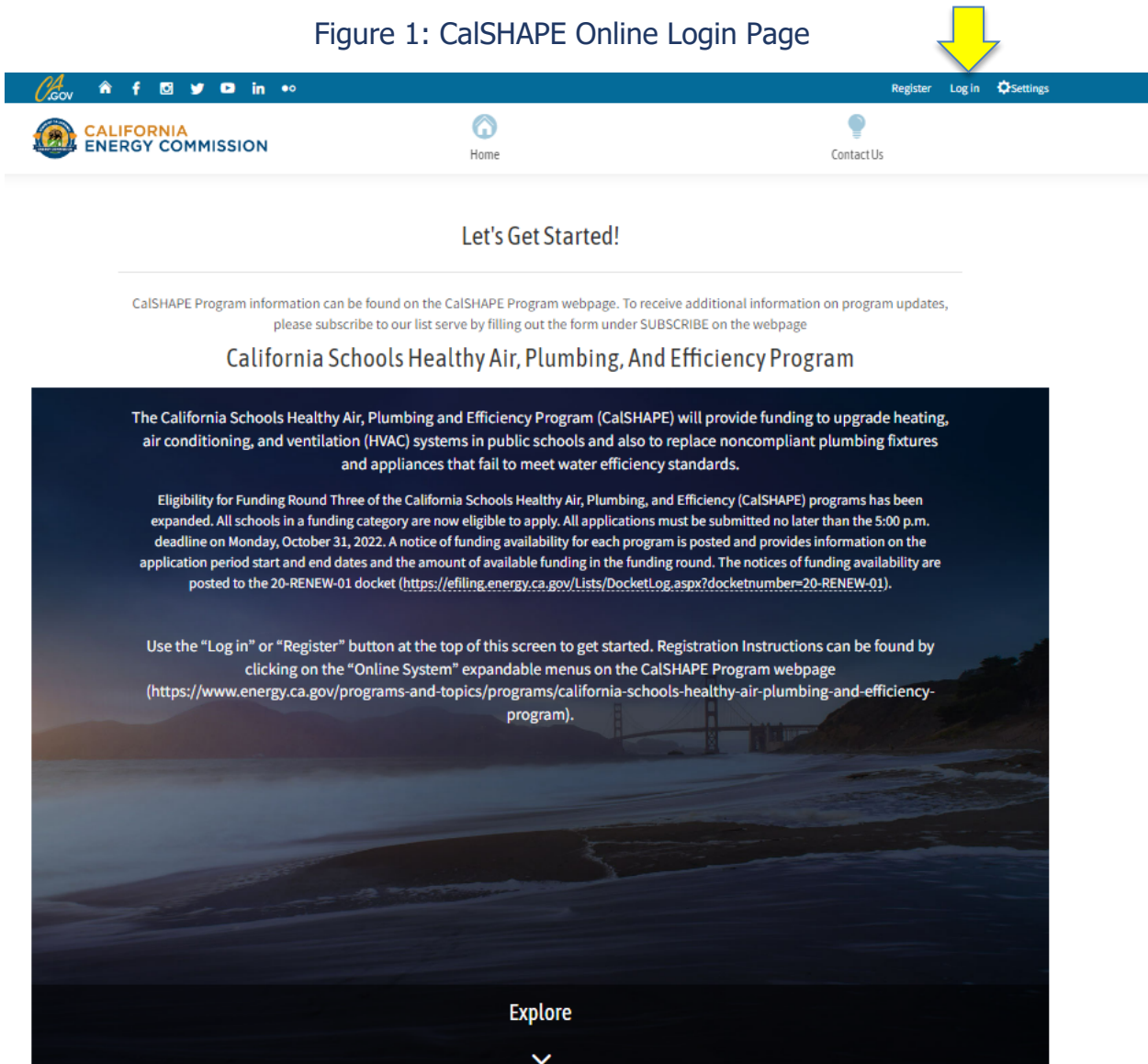
# Locating the HVAC Assessment Report Button

## Step 1: CalSHAPE Online System Homepage

Instructions:

1. Click on "Log in" located at the top of the screen.

Figure 1: CalSHAPE Online Login Page



Source: California Energy Commission, CalSHAPE Online System

## Step 2: Application Homepage

Figure 2: LEA Dashboard

**Application Homepage**

**Application Homepage**

Add Additional LEAs

LEA Code:

LEA Contact(s)

LEA Administrator has not registered.

	Total	Sites Underserved
	1	1

Applications

Ventilation Plumbing

	Ventilation	Plumbing
In Progress	0	0
Submitted	0	0
Awarded	1	1

LEA Dashboard

**LEA Dashboard** District:

Filter:  Enter a cds code or school name

Plumbing

Ref	Funding Round	Project Costs	Requested Amount	Status
Plumbing-1	R2	\$66,098.02	\$66,098.02	Ready to Submit

Ventilation

Ref	Funding Round	Project Costs	Requested Amount	Status
Ventilation-1	R1	\$140,920.00	\$169,104.00	Grant Fulfilled

Grant Awarded Information

Grant Reference	Start Date	End Date
	1/24/2022 2:47:45 PM	1/24/2024 2:47:45 PM

View Grant Detail

Source: California Energy Commission, CalSHAPE Online System

### Instructions:

1. Click on the "Application" icon to navigate the "Application Homepage" shown in Figure 2.
2. Locate the Applications section for the LEA that will start an HVAC Assessment Report and click the "LEA Dashboard" button.
3. Under the Ventilation section on the LEA Dashboard, locate the green "Grant Awarded Information" box and click on the "View Grant Detail" button.

Figure 3: Grant Summary - Reporting Button

Grant Summary

District:  
Grant #

Program:  
Ventilation-1

Grant Status:  
Grant Awarded

Application Dashboard

Grant Summary

Invoice

Document

Reporting

Grant Status History

Grant Amount Awarded

\$169,104.00

Grant Start - End Dates

1/24/2022

1/24/2024

Amount Paid Out

\$74,552.00

Funding Round - Tier

R1

TIER 1

Balance to be Paid

\$94,552.00

Funding Categ-Activity

PGE 1-PGE VENT ELEC

Project Costs

\$140,920.00

Requested Funding

\$169,104.00

Grant Sites

Count: 2

CDS Code	Site Name	Project Cost	Requested Funding
		\$72,720.00	\$87,264.00
		\$68,200.00	\$81,840.00
Totals		\$140,920.00	\$169,104.00

Grant Sites

CDS Code	Site Name	Requested Funding
		\$87,264.00
		\$81,840.00
Totals		\$140,920.00
		\$169,104.00

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. To start the HVAC Assessment Report, click on the "Reporting" button.
2. Locate the site name and click on the "Assessment" button.



# HVAC Assessment Report: Getting Started Information

Figure 4: Site Buildings

+ ADD NEW BUILDING

No Building records found

Grant Report Upload Files

**BUILDING INFORMATION - NEW ENTRY**

**Building Address**

**Building Age**

**Building Type**

**Approximate Square Footage of Conditioned Space**

**Utility Meter Information**

**Climate Zone**

**Utility Account Number**

SAVE CANCEL

Source: California Energy Commission, CalSHAPE Online System

## Instructions:

1. Click on "+ADD NEW BUILDING" button to create a new building information entry.
  2. Enter the following information and click the "Save" button (all Building Information is required to be entered):
    - a. Building Address and Building Age – Input the address and age of the building.
    - b. Building Type – Building construction type of the building (ex. wood-frame, heavy timber, or ordinary).
    - c. Utility Meter Information - Meter is unique to the school (can be found in utility service statement).
    - d. Climate Zone - All buildings are assigned a climate zone based on California's climate regions. Climate zone region for a specific zone or ZIP code can be found [here](https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/climate-zone-tool-maps-and): <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/climate-zone-tool-maps-and>.
    - e. Utility Account Number – 11-digit account number corresponding to the LEA's utility service account (PG&E, SCE, SDG&E, and/or SCG)
- Click on "Select" button to start HVAC equipment entries.

## HVAC Equipment Details for HVAC Units

Figure 5: HVAC Units

SCHOOL BUILDING INFORMATION			
Address:	1234 Test City	Account:	1234Test567
Meter:	1234test567		

### HVAC UNITS

+ ADD NEW HVAC

No HVAC Unit records found

+ ADD NEW HVAC

Model Number	Serial Number
<input type="text"/>	<input type="text"/>
SEER Rating	Refrigerant
<input type="text"/>	<input type="text"/>
Deficiencies	
<input type="text"/>	
Notes - Required if deficiencies is Yes	
<input type="text"/>	

SAVE

CANCEL



Source: California Energy Commission, CalSHAPE Online System

### Instructions:

1. Click "+ Add New HVAC" to add new HVAC unit entry or click "Edit" to make any changes to an existing HVAC unit entry.
2. Input model number, serial number, SEER rating, and refrigerant type.
  - a. SEER Rating (Seasonal Energy Efficiency Ratio) – This can be found on a yellow and black rating sticker on the side of the condenser or on an information sheet on the front of the air handler.
  - b. Refrigerant (ASHRAE Refrigerant Designations) – Refrigerant will be listed as "R-#" on the data sheet.
3. Utilize the "Notes" box to indicate any deficiencies found during assessment. Select "Yes" or "No" to indicate if there are any deficiencies found.
  - a. Utilize the "Notes" box to indicate any deficiencies found during assessment.
4. Click "Save."
  - a. From the "HVAC Units" page, click on the "Edit" button to begin inputting all the HVAC equipment details.


Figure 6: HVAC User Inputs and Setpoints


Typical Weekly Occupancy Schedule Time:

Start time:   End time:  



Typical Weekly Occupancy Schedule Day:

☐ Monday  
☐ Tuesday  
☐ Wednesday  
☐ Thursday  
☐ Friday  
☐ Saturday  
☐ Sunday

Typical Weekly HVAC Thermostat Heating Setpoint:  


Typical Weekly HVAC Thermostat Cooling Setpoint:  


Typical Weekly Fan Operation Schedule Time:

Start time:   End time:  



Typical Weekly Fan Operation Schedule Day:

☐ Monday  
☐ Tuesday  
☐ Wednesday  
☐ Thursday  
☐ Friday  
☐ Saturday  
☐ Sunday



Holiday/Break Weekly HVAC Thermostat Heating Setpoint:  

Holiday/Break Weekly HVAC Thermostat Cooling Setpoint:  

Holiday/Break Weekly Fan Operation Schedule:

Start time:   End time:  

Typical Annual Term Schedule: (Dates of Terms)

Start date:   End date:  

Notes

Save

Source: California Energy Commission, CalSHAPE Online System

### Instructions:

1. Click on the calendar and clock icon to select proper date and time and proceed with inputting the rest of the information (select the nearest whole hour).
  - a. Examples:
    - i. Typical Weekly Occupancy Schedule: 5:00am - 7:00pm

- ii. Weekly HVAC Thermostat Heating/Cooling Setpoint:  
(Temperature HVAC System will maintain throughout the day) - 68 (in Fahrenheit)
  - iii. Typical Weekly Fan Operation Schedule: 5:00am - 7:00pm (M-F)
    - 1. For automatic systems, provide an estimate window of operation.
  - iv. Holiday/ Break Weekly Fan Operation Schedule: If "Off" during this time, select "12:00 AM-12:00 AM".
  - v. Typical Annual Term Schedule: Aug – May
2. Click "Save."

Figure 7: HVAC Equipment Capacities

HVAC System Heating INPUT Capacity Based on Nameplate	<input type="text"/>	kBtuh
HVAC System Heating OUTPUT Capacity Based on Nameplate	<input type="text"/>	kBtuh
HVAC System Cooling Capacity	<input type="text"/>	kBtuh
HVAC System SUPPLY Fan Types	<input type="text"/>	▼
HVAC System RETURN Fan Types	<input type="text"/>	▼
HVAC System EXHAUST Fan Types	<input type="text"/>	▼
HVAC System SUPPLY Fan Motor Horsepower Ratings (hp) Based on Nameplate	<input type="text"/>	HP
HVAC System EXHAUST Fan Motor Horsepower Ratings (hp) Based on Nameplate	<input type="text"/>	HP
HVAC System RETURN Fan Motor Horsepower Ratings (hp) Based on Nameplate	<input type="text"/>	HP
HVAC Unit's Approximate Square Footage of Conditioned Space	<input type="text"/>	Sq. Ft.
Notes <div><div></div></div>		
<div>Save</div>		

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The HVAC Equipment Capacities section contains entries for specifications of HVAC equipment.
  - a. Enter HVAC system heating input and output capacity based on nameplate, and HVAC system cooling capacity in kBtuh.
  - b. Select "Direct Drive," "Pulleys/Belts," or "Variable Speed" for HVAC system supply, return, and exhaust fan types. Select "Not Applicable" for systems with no return fan or exhaust fan.
  - c. Enter HVAC system supply exhaust and return fan motor horsepower ratings (hp) based on nameplate.
  - d. Approximate HVAC unit's square footage of conditioned space.
2. Click "Save"

Figure 8: Walkthrough Checklist

<b>Filtration</b> - Review system capacity and airflow to determine the highest Minimum Efficiency Reporting Value (MERV) filtration for eliminating contagions, replace or upgrade filters where needed, and verify that such filters are installed correctly.	<input type="text"/>
<b>Ventilation Rate</b> - Calculation of the required outside air rates for each occupied area based on the anticipated occupancy and physical verification that the ventilation rate meets or exceeds the minimum ventilation set forth by the local jurisdiction in all modes of operation. •Outside Air •Exhaust Air	<input type="text"/>
<b>Ventilation System Operation</b> - Physically test all ventilation components for proper operation. • Economizer • Demand Control Ventilation	<input type="text"/>
<b>Air Distribution</b> - Verify all ventilation is reaching the served zone, how air is distributed, and that there is adequate distribution. •Inlet Total •Outlet Total	<input type="text"/>
<b>Building Pressure</b> - Verify a slight positive building pressure and a negative pressure for contaminant rooms temporarily occupied by sick patrons.	<input type="text"/>
<b>General Maintenance</b> - Verify coil condition, condensate drainage, cooling coil air temperature differential (entering and leaving dry bulb), heat exchanger operation, and drive assembly. Recommendations for additional maintenance, replacement or upgrades shall be recorded in the HVAC Assessment Report	<input type="text"/>
<b>Operational Controls</b> - Review of HVAC control sequences to verify systems will maintain intended ventilation, temperature, and humidity conditions during operation. Verify ventilation systems are programmed to flush the building for 2 hours prior and following occupancy.	<input type="text"/>
<b>CO2 Monitoring</b> - To ensure proper ventilation is maintained during building operation, at least one CO2 monitor shall be installed in each zone of the building.	<input type="text"/>
<b>HVAC Assessment Report</b> - Preparation of an HVAC Assessment Report that includes documentation of all verifications and deficiencies.	<input type="text"/>
<b>Energy and Ventilation Upgrades</b> - Upon completion of the HVAC Assessment Report, a Mechanical Engineer shall review and determine if upgrades can be made to the HVAC system to increase energy efficiency, filtration, disinfection, and ventilation.	<input type="text"/>
Notes <input type="text"/>	
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

### Instructions:

1. The Walkthrough Checklist section serves to ensure that HVAC Equipment is examined and verified to be in proper working condition.
  - a. Use the "Notes" box to provide additional information, findings, recommendation, or deficiencies found during this section.

Figure 9: Variable Frequency Drive

Variable Frequency Drive (VFD) Yes or No	<input type="text"/>
Manufacturer	<input type="text"/>
Model	<input type="text"/>
Operating Hz ( Full cooling or High Fan Speed)	<input type="text"/>
With unit operating at full cooling, or high fan speed, what is the filter pressure drop? (In w.c.)	<input type="text"/>
Notes	<input type="text"/>
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The HVAC System may use a Variable Frequency Drive.
  - a. If it does, enter "Yes" and the required fields (Manufacturer, Model, Operating Hz, and Filter Pressure Drop) will be indicated.
  - b. If not, then proceed to the next section.

Figure 10: MERV Filter Verification

Quantity	<input type="text"/>
MERV rating	<input type="text" value="v"/>
With the existing filters installed, perform, and document a static pressure profile, temperature profile, fan RPM, Motor RPM, voltage, and amps.	
ESP $\Delta$	<input type="text"/> W.C.
TSP $\Delta$	<input type="text"/> W.C.
Filter SP $\Delta$	<input type="text"/> W.C.
Fan	<input type="text"/> RPM
Motor	<input type="text"/> RPM
Mixed Air (RA+OSA) Temp	<input type="text"/> °F
Supply Temp	<input type="text"/> °F
Voltage	<input type="text"/>
Amps	<input type="text"/>
Hertz	<input type="text"/> Hz
Notes <input type="text"/>	
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The MERV Filter Verification section serves to analyze existing filters.
  - a. Input the quantity and rating of existing filters.
  - b. Put "-1" for any unavailable/not applicable fields.
2. Use the "Notes" box to provide explanation for fields with -1.
  - a. If a filter does not have a MERV rating, like a washable filter, then put not applicable and provide notes below.



Figure 11: Maximum Pressure Drop

With the maximum pressure drop achieved, document static pressure profile, temperature profile, fan RPM, Motor RPM, voltage amps, and note the ability to increase fan speed if needed.

ESP Δ	<input type="text"/>	W.C.
TSP Δ	<input type="text"/>	W.C.
Filter SP Δ	<input type="text"/>	W.C.
Fan	<input type="text"/>	RPM
Motor	<input type="text"/>	RPM
Mixed Air (RA+OSA) Temp	<input type="text"/>	°F
Supply Temp	<input type="text"/>	°F
Voltage	<input type="text"/>	
Amps	<input type="text"/>	
Hertz	<input type="text"/>	Hz

Notes (Describe how maximum pressure drop was achieved)

Save

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Determine the Maximum Filter Pressure Drop utilizing either of the two methods below.
  - a. Primary Method to verify airflow - Directly measure the change in airflow if accessible and efficient.
  - b. Secondary Method to verify airflow – Calculate the change in airflow
    - i.  $CFM_N = CFM_O \times (\sqrt{SP_N / SP_O})$
2. Using the maximum filter pressure drop, document various recordings for the corresponding HVAC System.
  - a. Provide/describe the technique used to determine maximum pressure drop in the "Notes" field.

Figure 12: Filter Walkthrough Checklist

Verify air volume, under maximum pressure drop condition, is within manufacturers specifications. Commonly specified as: <ul style="list-style-type: none"><li>Minimum CFM per ton (or)</li><li>Minimum Supply Air Temperature</li></ul>	<input type="text"/>
If applicable, document and take any measurements required to increase the filter frames to accommodate deeper filters.	<input type="text"/>
Remove added material and provide documentation in the assessment report so a licensed professional can determine the highest MERV filtration that can be installed with the existing equipment.	<input type="text"/>
Return the unit to normal operation and enable the economizer.	<input type="text"/>
Notes <input type="text"/>	
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Filter Walkthrough Checklist section serves to ensure that the desired filter will be able to be installed with or without modifications to the filter frame. Final determination for the highest MERV Filtration will be made by a licensed professional.
  - a. Provide additional information for fields that cannot modified in the notes box.

Figure 13: Ultraviolet Germicidal Irradiation

Quantity	<input type="text"/>
Replacement Lamp Wattage:	<input type="text"/> <input type="button" value="Watts"/>
Replacement Lamp Quantity:	<input type="text"/>
Notes <input type="text"/>	
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Ultraviolet Germicidal Irradiation section is for determining how many ultraviolet germicidal irradiation systems are part of the HVAC System.
  - a. Replacement lamp wattage and replacement lamp quantity are for the specifications and how many replacement lamps will be replaced in the HVAC System.
  - b. If not applicable, enter -1 for all sections.

Figure 14: Determine Minimum Required Outside Air (OSA)

Design Minimum Required OSA	<input type="text"/>	CFM
Does the zones actual use occupancy matches the designs expected use and occupancy (Yes or No)	<input type="text"/>	▼
System Original Occupancy Count (Design)	<input type="text"/>	Persons
Original Occupancy Category (Use)	<input type="text"/>	▼
Design Occupancy (Amount of people)	<input type="text"/>	Persons
Actual Occupancy( Actual amount of People)	<input type="text"/>	Persons
Occupancy Category (Current Use)	<input type="text"/>	▼
Current Occupancy	<input type="text"/>	CFM
New Minimum Outside Air Rate	<input type="text"/>	CFM
Notes <input type="text"/>		
<input type="button" value="Save"/>		

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The original design documents, if available, can be used to obtain:
  - a. Minimum required OSA
  - b. Original Occupancy
  - c. Occupancy Category and Occupancy.
2. The following can be determined by a method left up to the qualified testing personnel (CalSHAPE Ventilation Program Guidelines Chapter 2, Section B.2):
  - a. The Actual Occupancy
  - b. Occupancy Category
  - c. Occupancy
3. If the zones actual use and occupancy does not match the designs expected use and occupancy, a new (estimated) minimum outside air rate must be calculated and all fields will be required.

Figure 15: Verify Minimum Required Outside Air (OSA)

Disable demand control ventilation (if applicable)	<input type="text"/>	▼
Verify unit is not in economizer mode during test (economizer disabled)	<input type="text"/>	▼
<b>CAV and VAV testing at full supply airflow</b>		
Adjust supply air to achieve design airflow or maximum airflow at full cooling	<input type="text"/>	▼
Measured outdoor airflow reading (cfm)	<input type="text"/>	CFM
Required outdoor airflow (cfm)	<input type="text"/>	CFM
Time for outside air damper to stabilize after full supply airflow is achieved (minutes):	<input type="text"/>	min.
<b>VAV testing at reduced supply airflow</b>		
Adjust supply airflow to either the sum of the minimum zone airflows, full heating, or 30% of the total design airflow	<input type="text"/>	▼
Measured outdoor airflow reading (cfm)	<input type="text"/>	CFM
Required outdoor airflow (cfm)	<input type="text"/>	CFM
Time for outside air damper to stabilize after reduced supply airflow is achieved (minutes):	<input type="text"/>	min.
Returned to initial conditions	<input type="text"/>	▼
<b>Determine Percent Outside Air at full supply airflow (%OAFA) for Step 3.</b>		
%OAFA = Measured outdoor airflow reading / Required outdoor airflow.	<input type="text"/>	%
%OAFA is within 10% of design Outside Air. ( $90\% \leq \%OAFA \leq 110\%$ )	<input type="text"/>	▼
Outside air damper position stabilizes within 5 minutes. (Step 3d < 5 minutes)	<input type="text"/>	▼
<b>VAV only: Determine Percent Outside Air at reduced supply airflow (%OARA) for Step 4.</b>		
%OARA = Measured outdoor airflow reading / Required outdoor airflow reading. $100 \times (\text{Step 4b} / \text{Step 4c})$	<input type="text"/>	%
%OARA is within 10% of design Outside Air. ( $90\% \leq \%OARA \leq 110\%$ )	<input type="text"/>	▼
Outside air damper position stabilizes within 5 minutes. (Step 4d < 5 minutes)	<input type="text"/>	▼
Notes		
<input type="text"/>		
<input type="button" value="Save"/>		

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Verify Minimum Required Outside Air section contains steps and entries to ensure that the minimum required outside air obtained from the design documents or a qualified testing personnel's method is accurate.
2. Different fields will be required depending on the answer to the second question.
  - a. Fill in all required fields and put -1 for all "not applicable" fields.

Figure 16: Economizer Information

Economizer present in the system?	<input type="text"/>
Economizer Unit Model	<input type="text"/>
Economizer Serial number	<input type="text"/>
Economizer Temperature	<input type="text"/> °F
Economizer Enthalpy	<input type="text"/> btu/lbs
Single or Differential	<input type="text"/>
Demand Control Ventilation	<input type="text"/>
Economizer Control Type	<input type="text"/>
Economizer Changeover Temperature Setpoint	<input type="text"/> °F
Economizer Minimum Damper Position	<input type="text"/> %
Notes	<input type="text"/>
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Economizer Information section contains fields to analyze all required fields if an economizer is present.
2. If there are no economizers present in the system, then move on to the next section.

Figure 17: Verify Economizer Operation

Passing this test verifies the DCV and associated CO2 sensor operates as designed.

Disable demand control ventilation systems (if applicable)

Enable the economizer and simulate a cooling demand large enough to drive the economizer fully open (record all of the following)

Economizer damper modulates 100% open and that the return air damper modulates 100% closed.

All applicable fans and dampers operate as intended to maintain building pressure.

The unit heating is disabled (if applicable).

Disable the economizer and simulate a cooling demand (record all of the following):

Economizer damper closes to its minimum position.

All applicable fans and dampers operate as intended to maintain building pressure.

The unit heating is disabled (if unit has heating capability).

If unit has heating capability, simulate a heating demand and set economizer so that it is capable of operating (i.e., actual outdoor air conditions are below lockout setpoint). (record all of the following)

Economizer is at minimum position.

Return air damper opens.

Turn off the unit. Record if the Economizer damper closes completely.

Economizer functions as designed (Yes or No)

Notes

Save

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Verify Economizer Operation section contains steps to verify if the Demand Control Ventilation and associated CO<sub>2</sub> sensor operates as designed.
  - a. If the HVAC System does not have an economizer, then you may proceed to the next section.

Figure 18: Verify Air Distribution and Building Pressurization

Can Power Exhaust Be DISABLED?	<input type="text"/>
Can Power Exhaust Be ENABLED?	<input type="text"/>
Supply Outlets – Measure and document supply air volume (CFM). With Power Exhaust DISABLED (if applicable)	<input type="text"/> CFM
Return Inlets – Measure and document return air volume (CFM). With Power Exhaust DISABLED (if applicable)	<input type="text"/> CFM
Exhaust Inlets - Measure and document return air volume (CFM). With Power Exhaust DISABLED (if applicable)	<input type="text"/> W.C.
With Power Exhaust DISABLED (if applicable), determine if Measured Supply Air = Measured Outside Air + Measured Return Air	<input type="text"/> CFM
Building or Zone Pressure	<input type="text"/> W.C.
<ul style="list-style-type: none"> <li>• Document any discrepancies and determine the cause of significant discrepancies (i.e. leakage, ductwork serving other zones, inaccurate measurement location)</li> <li>• Document Building Pressure - Verify a slight positive building pressure and a negative pressure for contaminant rooms temporarily occupied by sick patrons</li> </ul>	
<div></div>	

Source: California Energy Commission, CalSHAPE Online System

#### Instructions:

1. Required fields will change based on the answers for the first two questions.
2. The Verify Air Distribution and Building Pressurization serves to determine if:
  - a. Measured Supply Air is slightly greater than Measured Return Air whether Power Exhaust is enabled or disabled.
  - b. Supply Outlet, Return Inlet, and Exhaust Inlet air volume must be measured.
3. Record the Building or Zone Pressure.
4. Verify if the Air Distribution for inlets and outlets are balanced within tolerance of the system design as listed within design documents.
  - a. If the Air Distribution is not within tolerance, take air distribution notes, document repairs and adjustment, and include relevant photographic documentation using the "Upload Files" located in the "Site Building" page.

Figure 19: Verify General Maintenance

Is coil condition verified?	<input type="text"/>
Is Downstream and Upstream condition verified?	<input type="text"/>
Is condensate drainage verified?	<input type="text"/>
Temperature Differential - Measure and Document cooling coil air temperature differential (entering and leaving dry bulb)	<input type="text"/> F
Temperature Differential (If applicable)	<input type="text"/> GPM
Verify heat exchanger operation – Measure and document air temperature differential (entering and leaving dry bulb)	<input type="text"/> F
Verify heat exchanger operation	<input type="text"/> GPM
Verify condition of drive assembly. (if applicable)	<input type="text"/>
Are there deficiencies?	<input type="text"/>
Document deficiencies, general condition of unit, and make recommendations for additional maintenance, replacement, or upgrades.	<input type="text"/>
Document Required Repairs and Adjustments	<input type="text"/>
Notes	<input type="text"/>
<input type="button" value="Save"/>	

Source: California Energy Commission, CalSHAPE Online System

### Instructions:

1. The Verify General Maintenance section is a checklist to ensure that the coil condition is assessed and whether repairs, replacements, or upgrades are necessary per the CalSHAPE Ventilation Program Guidelines Chapter 2, Section B.4.
2. Utilize the note boxes to provide additional information or to indicate any repairs and/or adjustments needed.



Figure 20: Conditioning Unit Details

Pre-Modification Unit Airflow	<input type="text"/>
Pre-Modification Unit Return Fan Power	<input type="text"/>
Pre-Modification Unit Supply Fan Power	<input type="text"/>
Pre-Modification Unit Exhaust Fan Power	<input type="text"/>
Post-Modification Unit Airflow	<input type="text"/>
Post-Modification Unit Return Fan Power	<input type="text"/>
Post-Modification Unit Supply Fan Power	<input type="text"/>
Post-Modification Unit Exhaust Fan Power	<input type="text"/>
Temperature Setpoint	<input type="text"/> F
Temperature Design	<input type="text"/> F
Humidity setpoint	<input type="text"/> %
Humidity Design	<input type="text"/> %
Notes	<div><div></div></div>
<div>Save</div>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Condition Unit Detail section asks for the recorded unit airflow and unit supply fan, return, and exhaust powers for both pre- and post- modification.
2. The temperature and humidity's setpoint and design corresponds to the control sequences of the HVAC system. The purpose of this page is to verify if systems will maintain intended conditions during building operation.
3. If no modifications can be made, put -1 to all fields and use the "Notes" box to provide an explanation.

Figure 21: Ventilation Schedule Operation

Ventilation operates continuously during occupied hours.

- Occupied hours to include all hours building is occupied by staff or patrons (i.e. teachers, security, janitorial staff, night shift, etc.)
- Includes all exhaust fans and fans used to distribute outside air.

Daily Flush

Verify a daily flush is scheduled for 2 hours before and after scheduled occupancy (or)

Demonstrate calculation of time for 3 air changes to reduce concentration of airborne infectious particles by 95% per ASHRAE Guidance for Building Readiness or otherwise applicable local or state guidance

Calculated Flush Time

Deficiencies - Document deficiencies, options for adjustment (i.e. Humidity) and recommendations for additional maintenance, replacement or upgrades.

Notes

Save

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Ventilation Schedule Operation section verifies that outside air is properly distributed when buildings are occupied and that a daily flush is conducted.
  - a. Any deficiencies must also be documented by using the "Deficiencies" field or the "Notes" box.

Figure 22: Fan Output Verification

Pre-Modification Fan Power:	<input type="text"/>
Post-Modification Fan Power:	<input type="text"/>
Notes	<div><div></div></div>
<div>Save</div>	

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Fan Output Verification section documents pre-modification and post-modification fan power.
  - a. If no modifications can be made, then put -1 and provide additional information.

Figure 23: CO2 Monitor

[+ Add CO2 Monitor](#)

No CO2 monitor records found

CO2 monitor status	<input style="width: 95%;" type="text" value="▼"/>
Quantity	<input style="width: 95%;" type="text"/>
Manufacturer	<input style="width: 95%;" type="text"/>
Model	<input style="width: 95%;" type="text"/>
Serial	<input style="width: 95%;" type="text"/>
All classrooms shall be equipped with a CO2 monitor.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Be hard-wired or plugged-in and mounted to the wall between 3 - 6 feet above the floor and at least 5 feet away from the door and operable windows.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Display the CO2 readings to the occupants through a display on the device or other means such as a web-based application or cell-phone application.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Notify the building operator through visual indicator on the monitor (e.g. indicator light) or other alert such as e-mail, text, or cell phone application, when the CO2 levels have exceeded 1,100 ppm.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Maintain a record of previous data which includes at least the maximum CO2 concentration measured.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Have a range of 400 ppm to 2000 ppm or greater.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitors shall: Be certified by the manufacturer to be accurate within 75 ppm at 1,000 ppm CO2 concentration and is certified by the manufacturer to require calibration no more frequently than once every five years.	<input style="width: 95%;" type="text" value="▼"/>
CO2 monitor installed meets the required features listed?	<input style="width: 95%;" type="text" value="▼"/>
If installed but lacking required features, what features are missing?	<input style="width: 95%;" type="text"/>
<p>Notes</p> <div style="border: 1px solid #ccc; height: 30px; width: 100%;"></div>	

Save
Cancel

Source: California Energy Commission, CalSHAPE Online System

## Instructions:

1. The CO2 Monitor section documents quantity and CO2 monitor information to be installed for the sites' classrooms.
  - a. Click the "+ Add CO2 Monitor" to add a new CO2 monitor entry.
  - b. If there are fields that cannot be determined, put -1 and provide an explanation as to why the information is unattainable.
  - c. Use the "Edit" button to update any existing information.

Figure 24: Motor

+ Add Motor

No motor records found

Quantity

Manufacturer

Model

Phase

HP

Frame

RPM

HZ

Service Factor

Amps

Volts

ECM

Notes

Save

Cancel

## Instructions:

1. The Motor section is to document various specifications of the motor utilized in the HVAC System. Motor information and specifications may be found on the nameplate attached to the motor.
  - a. Click on the "+ Add Motor" button to input data.
  - b. Repeat process for additional motors.

Figure 25: Drive Assembly

+ Add Drive

No drive records found

Drive Assembly Type (Belt or Direct)

Number of Belts

Belt Type

Belt Length

inches

Center to Center measurement

inches

Motor Sheave

Motor Sheave Model Number

Motor Sheave Shaft Size

inches

Motor Sheave Position (if Variable)

inches

Fan Sheave

Fan Sheave Model

Fan Sheave Shaft Size

inches

Notes

Save

Cancel

Instructions:

1. The Drive Assembly section requests additional information relating to the drive assembly belt, motor sheave, and fan sheave.
  - a. Click on the "+ Add Drive" button to input data.
  - b. Repeat process for additional motors.

Figure 26: Existing Filter Data

+ Add Existing Filter

No existing filter records found

Filter Quantity

Filter Size (W x L)  inches

Filter Depth  inches

MERV rating

Is the filter installed correctly and are the frames and filter bank free of any openings around the filters that would allow for untreated air to bypass the filters?

If No above, then document deficiencies found.

Notes

Save Cancel

Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Existing Filter Data section requires entry of filter information before new replacement filters are installed.
2. Indicate if there are any deficiencies found and using the "Notes" field, input any additional information regarding

# File Matrix Template

Figure 27: Upload Files

**GETTING STARTED**

How do I get started?

What essential files do I need for the assessment?

**SITE BUILDINGS**

[+ ADD NEW BUILDING](#)

No Building records found

[Grant Report](#)[Upload Files](#)

[Generate File Upload Template](#)

Maximum file size: ~50 MB  
Allowed file type: pdf, doc, docx, xls,xlsx, ppt, pptx, rtf, txt, dwg, dxd, kmz, kml, jpg, jpeg, png, tif, tiff, gif, mp4, avi, wmv, mov, mpeg

Drop files here

[Select](#)Please select file(s) to upload.

**Supporting Documents**

No supporting documents uploaded

Source: California Energy Commission, CalSHAPE Online System

## Instructions:

1. After all buildings and HVAC units have been saved in the system, return to the "Site Buildings" page, click on "Upload Files."
2. Click the 'Generate File Upload Template' button to generate an Excel file template for listing assessment file name references by building and HVAC unit.
3. Click "Select" to upload all files and documents you wish to add.



## Contact Us

For any questions regarding the HVAC Assessment Report please contact [CalSHAPE@energy.ca.gov](mailto:CalSHAPE@energy.ca.gov).